

Spin Monitoring at PHENIX

“Preparations for First Polarized Proton Collisions”

November 6, 2001

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Scope

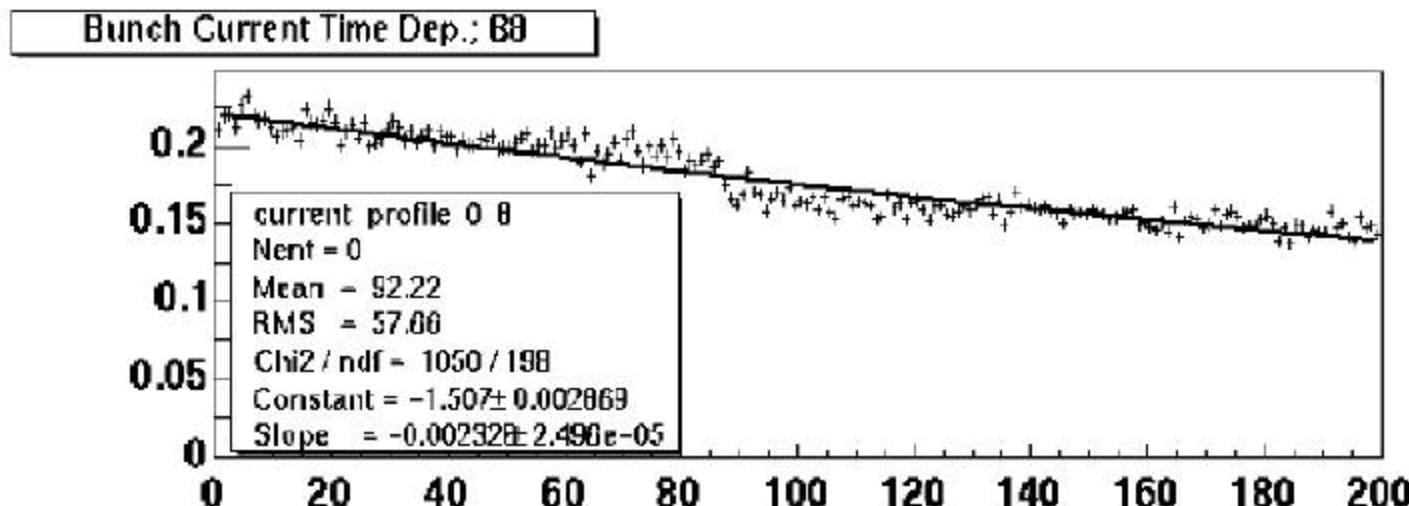
- confirmation of run conditions
 - all necessary information
 - comparison with other system
 - accelerator
 - polarimeter
 - other exps
- luminosity monitoring
 - goal: relative precision 10^{-4}
 - how stable ?
- polarization monitoring
 - (false-) asymmetry analysis
 - fast analysis

Run conditions

- polarimeter
 - synchronous / asynchronous
 - minimum polarization ?
- bunch filling / polarization pattern
 - V124
 - event-by-event
 - fill/+/-/0
 - CDEV
 - intended filling / polarization pattern
 - should be consistent with polarimeter / event pattern
- beam / luminosity conditions ...
 - minimum ? ...

Luminosity monitoring

- bunch current
 - CDEV
 - update interval ~ 4sec
 - all these values will be recorded on data stream (every 30sec)



by H. Sato

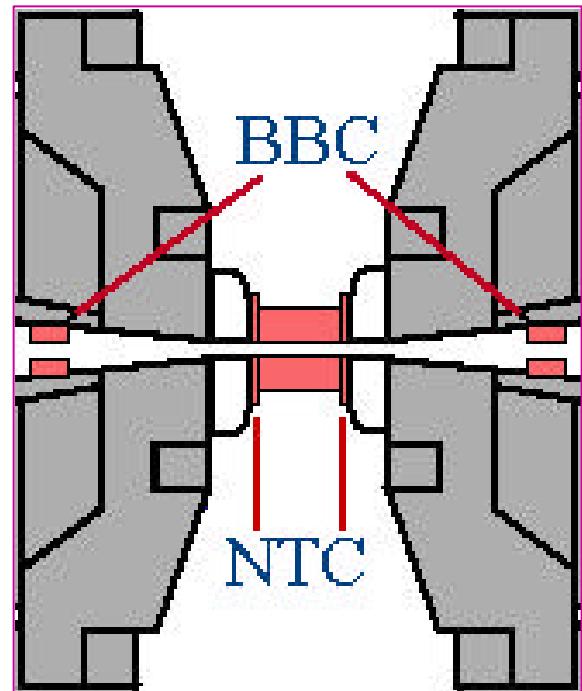
- good precision
- blue × yellow ~ luminosity ?

CDEV information

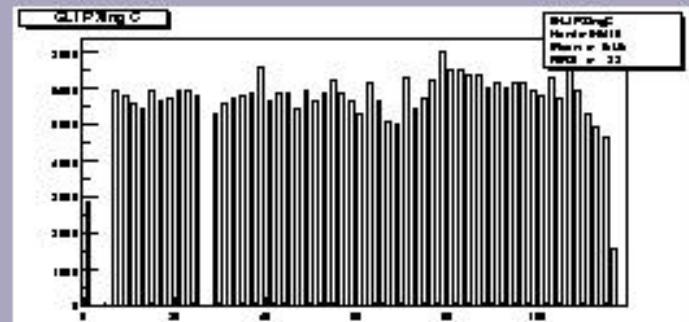
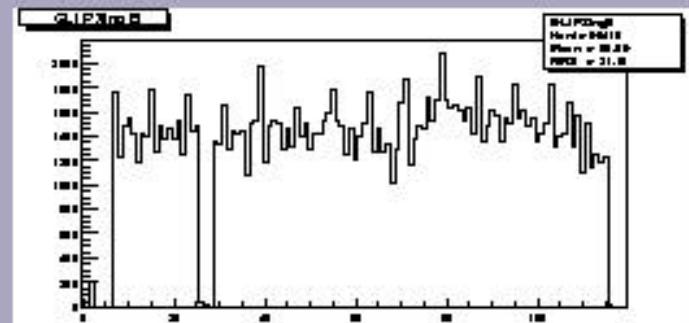
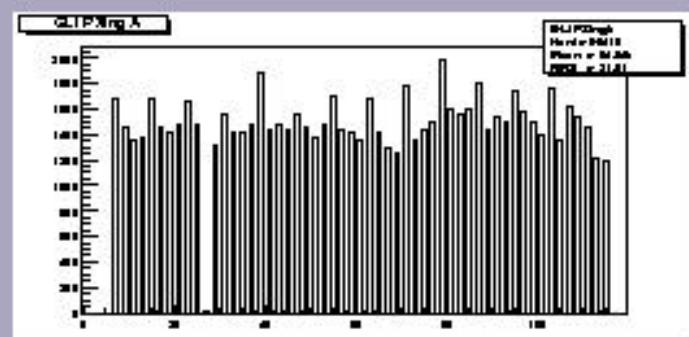
- bunch-by-bunch
 - intended filling pattern, measured filling pattern, polarization filling pattern, polarimeter, ...
 - ring-by-ring
 - beam energy, total beam current, estimated beam size at IR, momentum spread, bunch length, average orbit from DX BPM, β^* , ...
 - total
 - estimated luminosity from optics, time stamp, ...
- Objy DB every 10min
- beginning-of-run event

Luminosity monitoring

- GL1P scaler
 - xing-by-xing scalers
 - 120×4 scalers
 - plan
 - A: BBC (Beam-Beam Counter)
 - B: NTC (Normalization Trigger Counter)
 - C: ZDC
 - D: EMCal
 - comparison of these 4 scalers are essential
 - asymmetry study in these scalers ...
 - all 4 scalers need to be stable



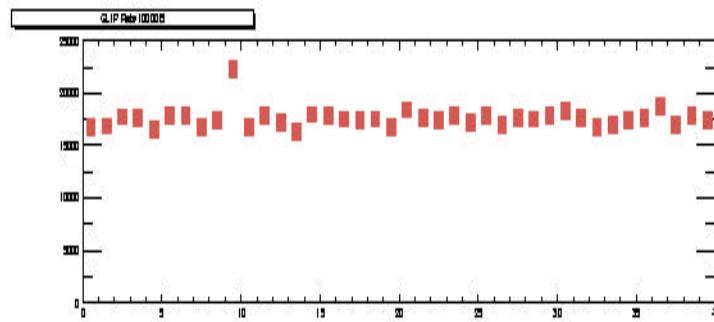
A: BBCLL1 \otimes ZDCNS



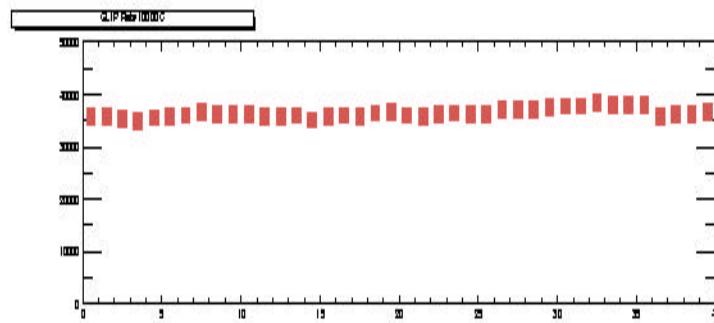
#crossing

10000evts

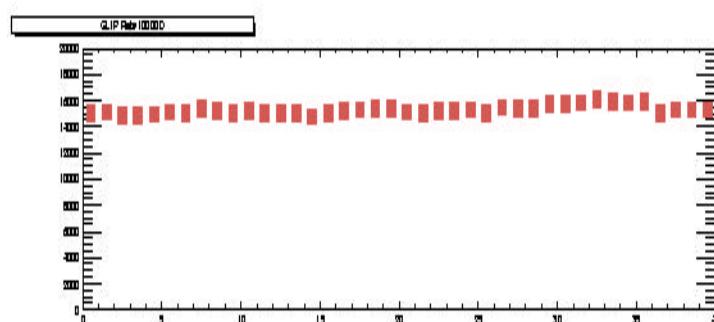
B: BBCLL1



C: ZDCNS

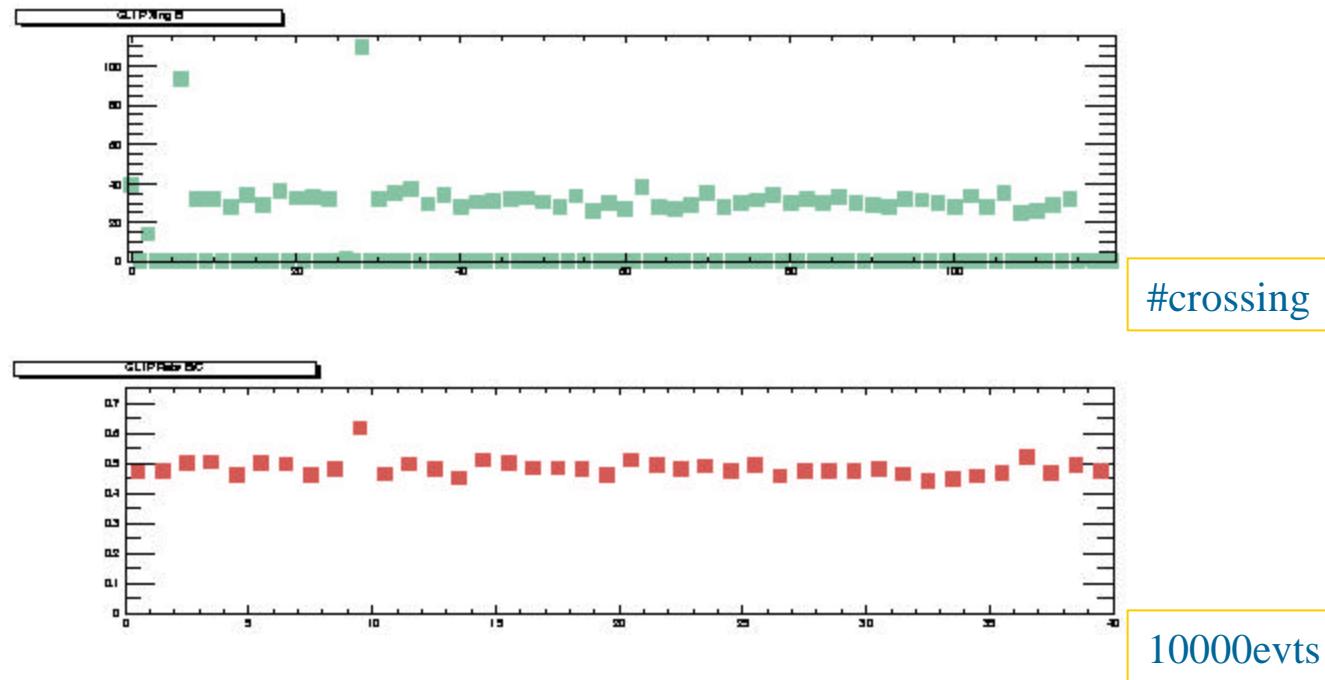


D: BBCNS \otimes ZDCNS



Luminosity monitoring

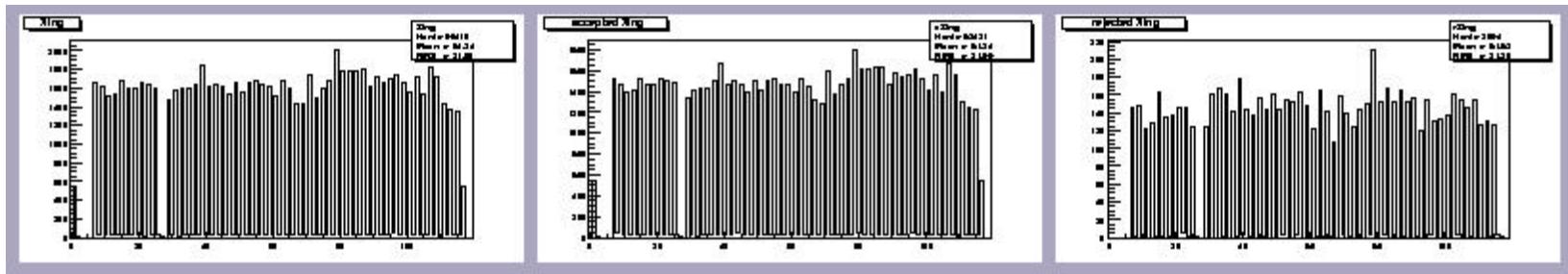
- ratio ...
 - B: BBCLL1 / C: ZDCNS



- no stable solution yet in H.I. study
- backup plan
 - coincidence with ++ / +- bits from V124
 - ➔ GL1 scaler

Luminosity monitoring

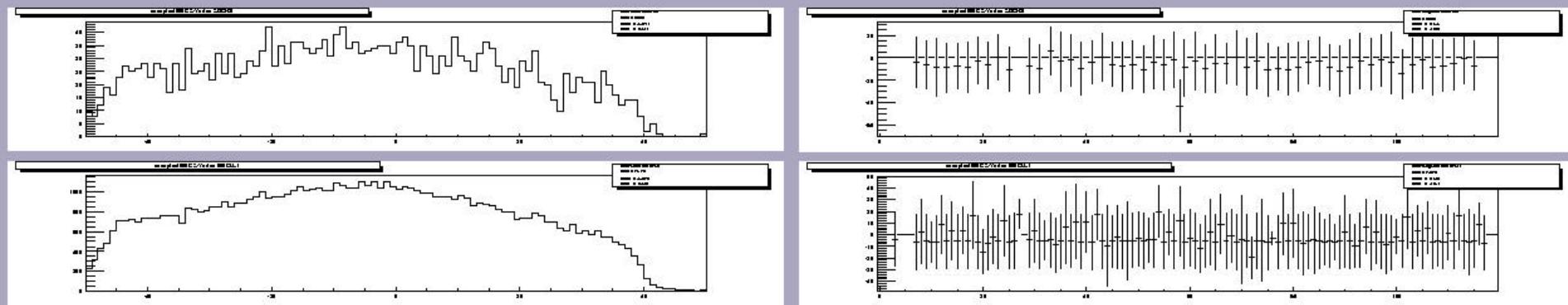
- trigger rate / scaler
 - level-1 accepted, level-2 accepted, level-2 rejected



#crossing

- vertex distribution

ZDCNS



z-direction

BBCLL1

#crossing

Polarization monitoring

- comparison with polarimeter
- (false-) asymmetry analysis
 - detector data
 - EMCal
 - tracking
 - muon
 - ...
 - fast analysis plan ...
 - at RCF
 - at RIKEN CC-J

Outlook

- many items to prepare before the polarized proton collisions
 - V124 data, CDEV data, ...
 - fast analysis environment
- many items to study with H.I. collisions
 - GL1P scaler study
 - false asymmetry study
 - trigger, vertex, ...
- many items to finish in the polarized proton commissioning
 - GL1P contents
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